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Accelerating Inflation?

The battle against inflation has been the economy's great success story in the 1980s. The annual rate of inflation, as measured by the GNP fixed-weighted price index, dropped from nearly double digits in 1980 to a low of less than three percent in 1986. Last year the inflation rate in this index moved up a bit to four percent. Many analysts forecast roughly this same rate of inflation through the end of 1988.

Recently, however, there has been concern about the potential for a larger acceleration in inflation. Besides some telltale signs from various price indexes in recent months, the economic fundamentals are moving in directions that also raise a legitimate concern about higher inflation. This *Letter* discusses the relationship between inflation and these fundamentals, and then draws some implications for inflation's outlook.

Oil prices and the dollar

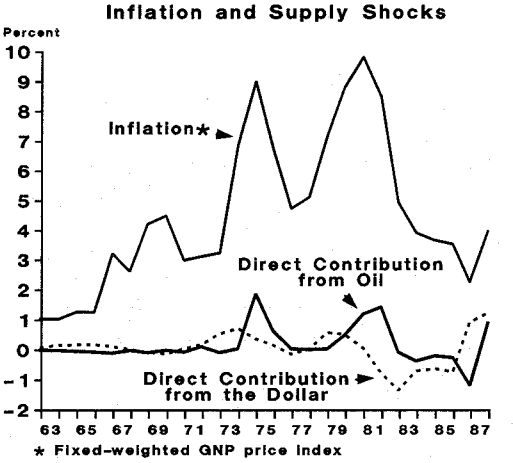
"Supply shocks" can have an impact on the inflation rate because they change the level of prices. While the economy is adjusting to the new level, the rate of change in prices accelerates or decelerates, depending on the nature of the shock. Oil, for example, has had a significant direct impact on price level changes because its price is highly volatile, and it is a major input in the productive process. Inflation was particularly low in 1986 because of a sharp drop in worldwide oil prices. Conversely, upward shocks from the price of oil directly contributed nearly two percentage points to the inflation rate in both 1974 and 1981.

The value of the dollar also has had a significant effect on the price level. The GNP fixed-weighted price index does not include prices of imports, but competition from foreign-produced goods affects the prices of domestically-produced goods. For example, when the value of the dollar falls, dollar prices of imports and foreign goods competing with U.S. exports rise. This allows the producers of exports and import substitutes in the U.S. to raise their prices.

Chart 1 shows our estimates of the direct contributions of changes in oil prices and the value of the dollar to the U.S. inflation rate since the early 1960s. Although food prices currently are "shocking" the economy, the price of oil and the value of the dollar have been more important than food prices in the past. In some years—notably 1974 and 1987—the combination of surging oil prices and a declining dollar directly contributed more than two percentage points to inflation. These two factors also contributed indirectly to inflation by heightening inflationary expectations during these periods.

Chart 1

Inflation and Supply Shocks



Demand pressure

However, the broad acceleration of inflation in the 1960s and 1970s, and the deceleration of inflation in the 1980s, cannot be explained solely by such supply shocks. Instead, we must look to aggregate demand pressures, which are generally caused by fluctuations in the growth of the stock of money.

A level of aggregate demand that exceeds the economy's capacity to produce causes prices to be bid up as resource shortages develop. Labor is the most important resource that can be in short

supply when aggregate demand is excessive. Like any other price in the economy, wages adjust to changes in supply and demand. Moreover, because of the strong linkage between the overall price level and total wage costs, demand inflation largely is determined by supply and demand conditions in the labor market.

Labor market dynamics

An overall shortage in the labor market has two effects on the inflation rate, one direct and the other indirect. First, the shortage has a direct effect on nominal wages. In general, both employers and workers ultimately are concerned only about real wages, and negotiations over nominal wages take into account the inflation anticipated by both parties over the life of the labor contract so that real wages are unaffected by inflation. A shortage of labor, therefore, induces employers to bid up anticipated *real* wages in an attempt to attract more labor. In other words, employers bid up nominal wages by more than the anticipated rate of inflation.

Of course, when all producers bid up wages, the overall level of wages rises. Increased wage costs are then passed on to buyers in the form of higher prices, and inflation tends to rise faster than market participants originally had expected. Because expectations fall short of actual inflation, employers and workers revise their expectations of future inflation upward. This is the indirect effect of a shortage in the labor market. The inflationary norm against which all current wage negotiations are conducted is raised so that the same expectations for real wages prevail as before.

But this second adjustment occurs very gradually. We estimate that it takes about three years for a permanent change in the inflation rate to become fully anticipated in wage changes. Only a few labor contracts are this long. Therefore, contracting is only a partial reason for this slow adjustment. Another important reason is that the actions of all agents taken collectively lead to a disappointment of original expectations.

In summary, a shortage in the labor market directly raises wages, and then prices, relative to the anticipated rate of inflation. Then, because actual inflation exceeds anticipated inflation, there is a further boost to inflation as inflationary expectations of market participants get revised upward. Actual inflation will continue to exceed anticipated inflation so long as there is a labor shortage associated with an excess of aggregate demand, and the resulting "wage-price spiral" will continue to generate accelerating inflation.

Thus, the key to preventing accelerating inflation is to prevent a labor shortage from developing in the first place. Moreover, because inflation is costly (in terms of lost output and employment) to slow down once it gains momentum, it is helpful if policymakers can take actions to reduce aggregate demand pressures before labor shortages become a serious problem. In this respect, policymakers need to have a sense of the point at which labor shortages are likely to develop.

Estimating full employment

The unemployment rate below which there is a labor shortage, and above which there is a labor surplus, is referred to as the full employment rate of unemployment. It is also called the "natural" rate of unemployment because in the long run it is the only sustainable unemployment rate. At full employment, unemployment is only "frictional" in the sense that it is due to normal job turnover and movements into and out of the labor force. Even though there still is some frictional unemployment, supply and demand in the labor market can be said to be in balance.

To obtain an estimate of this full employment rate of unemployment, we must first estimate the portion of total inflation that is produced by direct pressure of demand in the labor market. This is called the "direct demand component" of inflation and is obtained by subtracting from the actual inflation rate 1) the direct effect of oil prices, 2) the direct effect of the dollar, and 3) the market's expected rate of inflation, which we have estimated using a weighted three-year moving average of past inflation. The solid line in Chart 2 plots this direct demand component of inflation.

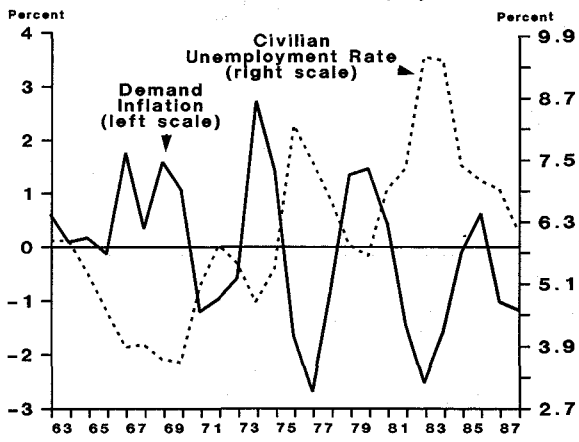
Theory tells us that the direct contribution of demand to inflation is zero when there is neither a shortage nor a surplus in the labor market—in other words, when the economy is at full employment. We can therefore obtain an estimate of the full employment rate of unemployment by plotting the civilian unemployment rate (dotted line) on the same chart with the direct demand

component of inflation (solid line), and observing the unemployment rate at which, on average, there is no direct demand inflation. Chart 2 does this with one slight adjustment. The demographic composition of the labor force has changed over time, thereby increasing the full employment rate of unemployment in the 1960s and 1970s, and reducing it somewhat in the 1980s. The civilian unemployment rate has been adjusted to remove changes in the unemployment rate that were due to changes in the demographic composition of the labor force.

Chart 2 shows a striking inverse relationship between the portion of the inflation rate associated with direct demand pressure and the (adjusted) civilian unemployment rate. This confirms the hypothesis that when there is a shortage in the labor market, demand inflation exceeds market participants' expectations for inflation. Also, since the measure of anticipated inflation is a weighted average of past inflation, the observed relationship shows that when there is a shortage of labor, inflation tends to accelerate.

Chart 2

Demand Inflation and Unemployment



We estimate that, *on average*, the inflation rate has tended to accelerate when the civilian unemployment rate is less than 5¾ percent, and to decelerate when the unemployment rate exceeds that amount. However, as Chart 2 shows, the correlation between the measure of direct demand inflation and the (adjusted) unemployment rate is not perfect. This means that the estimate of the full employment rate of unemployment is subject to error. The true full employment rate could be as high as 6½ percent or as low as 5 percent. Estimates of various other analysts also tend to fall within this range.

Outlook for inflation

The civilian employment rate dropped roughly one full percentage point in 1987, and another half point so far this year, to stand at 5.3 percent in June. Thus, the evidence suggests that the economy is well within the range of full employment. Real growth strong enough to push the unemployment rate below its current level could lead to labor shortages that would generate accelerating inflation.

How much growth is "strong enough?" In the last two decades, when the unemployment rate was constant, increases in the labor force and labor productivity generated yearly growth in real GNP of between two and three percent. Thus, real GNP growth in excess of this range over a sustained period would push the unemployment rate below its full employment level. Given the current unemployment rate, it is important to slow real growth below the almost 4 percent average rate of the last five quarters if we wish to avoid the danger of accelerating inflation.

Moreover, the potential for supply shocks presents an additional risk. For example, although the dollar has strengthened recently, this may be only a temporary phenomenon. A future depreciation in its value could raise the rate of inflation. The direct effect on inflation would last only so long as the dollar continued to depreciate. But there is a concern that the indirect effect on inflationary expectations could generate a more permanent increase in the inflation rate. With the economy at full employment, dollar depreciation would cause a greater rate of inflation than anticipated and could set in motion a more lasting acceleration in the wage-price spiral.

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